

SECRET

REPORT

50X1

COUNTRY Czechoslovakia

50X1

DATE DISTR. 30 March 1954

SUBJECT 1. Production of Receiver and Special
Low-Power Electronic Tubes
2. Production of Sun Lamp Burners

NO. OF PAGES 14

DATE OF INFORMATION

REFERENCES:

50X1

PLACE ACQUIRED

THIS IS UNEVALUATED INFORMATION

50X1

Producers of Receiver and Special Low-Power Electronic Tubes

1. Until approximately the beginning of 1950 receiver and special low-power electronic tubes were produced by Tesla Hloubetin II, National Enterprise, in Prague, Hloubetin 186; by Tesla Holesovice, in Prague (I do not remember the street address but it was a former Telefunken plant); by Tesla Vrsovice, in Prague, Vrsovice SNB Alley 55; and by Tesla Vrchlabi in Vrchlabi N 50-38, E 15-367. At about the beginning of 1950 this type of production was liquidated in the Tesla Hloubetin II and Holesovice plants and transferred to a new plant, Tesla Roznov, National Enterprise, at Roznov pod Radhostem N 49-28, E 18-087. The production of these tubes in the Tesla Vrsovice and Tesla Vrchlabi plants continued. The plants listed above were the only factories in Czechoslovakia for the industrial production of receiver and special low-power electronic tubes. (I do not know if there was any production of special low-power electronic tubes in military institutes.)

SECRET

SECRET

- 2 -

Quality of Tubes

2. The Czechoslovak receiver electronic tubes were standard European types, that is, they were of the same design and of the same electric performance characteristics as the receiver tubes of the same designation produced by leading Western European firms such as Philips and Telefunken. The Czechoslovak special low-power electronic tubes conformed in regard to design and electric performance characteristics to a Philips or a Telefunken product. But the quality and life of both receiver tubes and special low-power tubes reached only about 85% of the quality and life of the Western European product. The quality of Czechoslovak products was about the same from 1946 through 1953. However, there was a slight deteriorating tendency. The difference in quality between the Czechoslovak and Western European tubes was mostly caused, between 1946 and 1949, by lack of Czechoslovak production experience in these fields and, between 1949 and 1953, primarily by the poor quality of materials and the deteriorating morale of labor. Insofar as these tubes conformed to Western European types, no technical description of individual groups is given here. (The description is available in any Western European catalogue of electronic tubes.)

Prices

- 50X1 3. The prices of individual tubes given below are pre-currency reform () prices; the present price is one fifth that price. When the tube was declared second quality (the letter "Z" was added to its designation), the price of the standard receiver tubes, both with supporting base and all-glass, which were produced in 1950, was half of the price of the tube as given below. The tube was considered second quality when its appearance was not perfect or if the performance characteristics differed slightly from those prescribed. No guarantee was given for such a tube.

Production Capacity

4. The production capacities of the plants producing receiver and special low-power tubes were as follows:

- a. As far as the Tesla Hloubetin II, Tesla Holesovice, and Tesla Vrchlabi plants are concerned, the figures given below for each type tube /paragraphs 5 - 15/ for the year 1949 represent the actual production. The production capacity for 1949 was as follows:

Hloubetin	All-glass electronic tubes	1,200,000 units
	Electronic tubes with supporting base (socle)	500,000 "
	Low-power special electronic tubes	10,000 "
Vrchlabi	All-glass tubes and electronic tubes with supporting base (socle)	5,000 "
Holesovice	Electronic tubes with supporting base (socle)	250,000 "

About half of this quantity was produced in 1946. In fact, the output doubled from 1946 to 1949 to make up, step-by-step, for the decreasing imports. Imports had almost stopped during 1950. The output of the Tesla Hloubetin II and Tesla Holesovice plants was about the same in 1949, 1950, and in 1951, because in 1950 production was being transferred to the Tesla Roznov plant, and

SECRET

SECRET
- 3 -

50X1

in 1951, the Roznov plant was not as yet consolidated and suffered from a labor shortage. From 1952 the total output of the Roznov plant increased, because miniatures were put into production in that year, while the production of all-glass tubes was moderately increased and that of electronic tubes with supporting base (sode) was moderately decreased. The production of the Tesla Vrchlabi plant was moderately increased from 1950 [redacted] 50X1

- b. At the Tesla Vrsovice plant, the production of low-power special electronic tubes was started in 1947 and amounted to about one-tenth of the 1951 output. The first considerable increase was in 1948 and a second one occurred [redacted] Details are given under paragraph 15.7 50X1

Electronic Receiver Tubes

5. All-glass electronic tubes were used for radio receivers which were in production in Czechoslovakia.

Type	Price	Production
a. ECH 21	243.90 crowns	about 400,000 units in 1949
b. UCH 21	268.90 crowns	about 400,000 units in 1949

The design, electric performance characteristics, and life of both of these tubes were the same. The difference was in the heating filament: ECH 21 had a 6.3 v. filament, while UCH 21 was equipped with a 200 ma filament. These tubes were produced in the Tesla Hloubetin II plant until 1950.

Type	Price	Production
c. EBL 21	253.60 crowns	about 200,000 units in 1949
d. UBL 21	253.60 crowns	about 200,000 units in 1949

These tubes were indiscriminately produced by Tesla Hloubetin II and Tesla Vrchlabi until 1949.

e. EF 22	163.70 crowns	about 200,000 units in 1949
----------	---------------	-----------------------------

This tube was produced in Tesla Vrchlabi.

At the beginning of 1950 the Tesla Hloubetin production of all-glass tubes was transferred to the Tesla Roznov plant. There was no increase in the output for 1950 and 1951 for the reasons mentioned above. There may have been an increase of as much as 25% in the output after 1951, because production on conveyor belt system was introduced in 1952. This was the only conveyor belt for the production of electronic tubes in Czechoslovakia. The Tesla Vrchlabi plant continued its production. The output may have increased from 1950 from 25% to 50%. Two new types of all-glass tubes were set into production there:

Type	Price	Production
f. 6F 24	-	Began in 1950, output from 50,000 to 100,000 units yearly
g. 6L 24	-	Began in 1951, output from 50,000 to 100,000 units yearly

SECRET

SECRET

- 4 -

Electronic Tubes with Supporting Base

6. These tubes were used for replacement purposes for older types of radio receivers which had been produced in Czechoslovakia until 1945. The production of these tubes was known in the plants as "split series" production because the tubes were produced irregularly and in small quantities.

Type	Price	Production
a. UY 1N	92.90 crowns	about 200,000 units produced in 1949, partly in the Tesla Hloubetin II plant and partly in the Vrchlabi plant
b. ABL 1	243.90 crowns	about 50,000 units in 1949
c. EBL 1	253.60 crowns	about 50,000 units in 1949

ABL 1 and EBL 1 were of the same design; the first was equipped with a 4 v. heater, the second with a 6.3 v. heater.

Type	Price	Remarks
d. AL 4	220.50 crowns	About 50,000 units of each of these three types of tube were produced in 1949. The tubes were of the same design, but the supporting base was of a slightly different shape in each. E types were equipped with a 6.3 v. heater, A types with a 4 v. heater.
e. EL 3	220.50 crowns	
f. EL 11	220.50 crowns	
g. ECH 4	243.90 crowns	about 50,000 units in 1949
h. ECH 3	243.90 crowns	about 50,000 units in 1949
i. EF 9	163.70 crowns	about 50,000 units in 1949

The tubes listed above 6 through 17 were produced in the Tesla Hloubetin II plant. The production of these tubes from g through i was transferred at the beginning of 1949 to the Tesla Holesovice plant.

7. The tubes listed below were socket tubes (they had supporting bases) and were produced at the Tesla Holesovice plant. They were produced in smaller series than the tubes with supporting bases listed above paragraph 6. One series was from 5,000 to 20,000 units. Approximately 250,000 units of various tubes of this class were produced yearly. More types of tubes were produced from 1945 until the end of 1948, but the number of units of each type produced was less; fewer types of tubes were produced but in larger quantities.

Type	Price	Remarks
a. ACH 1	243.90 crowns	This tube was replaced, at the end of 1949, by ACH 4 which was easier to produce. ACH 4 was identical to ECH 4 <u>see paragraph 6, g</u> except that the heating filament was four volts.
b. AD 1	235.60 crowns	
c. AF 3	163.50 crowns	
d. AF 7	156.80 crowns	

SECRET

SECRET

- 5 -

50X1

Type	Price	Remarks
e. EBF 11	196.90 crowns	
f. ECL 11	253.60 crowns	These tubes were of the same design, the only difference was in the heater: U-type had 200 ma but the voltage varied according to the size of the tube. E type had 6.3 v. but the number of amperes varied according to the size of the tube.
g. UCL 11	278.60 crowns	
h. EF 6	173.70 crowns	
i. EFM 1	101.10 crowns	The same design, only the socle was formed differently
j. EFM 11	101.10 crowns	
k. EL 12	267.50 crowns	
l. EM 4	167.90 crowns	The same design, only the socle was formed differently
m. EM 11	167.90 crowns	
n. AZ 1	48.50 crowns	The same design, only the socle was formed differently
o. AZ 11	48.50 crowns	
p. 1805	48.50 crowns (probable price)	
q. AZ 12	86.90 crowns	

The tubes mentioned under above /a through q/ were produced mostly in the period [] The following tubes were mostly produced during the period from 1945 through 1947.

Type	Price
r. AZ 4	86.70 crowns
s. AL 5	267.50 crowns
t. EBC 3	163.70 crowns
u. EBC 11	163.70 crowns
v. ECH 11	243.90 crowns
w. EDD 11	234.30 crowns
x. EL 5	267.50 crowns
y. EF 11	163.20 crowns
z. EF 12	163.70 crowns
aa. EL 6	292.40 crowns
bb. EZ 4	97.90 crowns

SECRET

SECRET
- 6 -

50X1

Type	Price
cc. EZ 11	104.70 crowns
dd. EZ 12	unknown
ee. VCL 11	132.00 crowns
ff. VF 3	177.50 crowns
gg. VF 7	177.50 crowns
hh. VL 4	243.90 crowns
ii. VY 1	unknown
jj. UBF 11	116.30 crowns
kk. UCH 11	268.80 crowns
ll. UCL 11	278.60 crowns
mm. UM 4	184.60 crowns
nn. UY 11	92.90 crowns

8. All the tubes with supporting bases mentioned above /paragraphs 6 and 7/ were produced, after 1949, in the Tesla Roznov plant. I believe that the quantities produced were about the same for the years [redacted] as they were for 1949, with a slight decreasing tendency.

Special Electronic Tubes with Supporting Base

9. These tubes were of a higher power than those mentioned above /paragraphs 6 and 7/. They were not intended for radio receivers but for amplifiers, etc. They were produced in Tesla Hlubetin II until 1950 and then in the Tesla Roznov plant. [redacted]

Types	Price	Production
a. 4654	483.20 crowns	10,000 units in 1949
b. EL/51	1,659.00 crowns	5,000 units in 1949
c. AX 50	247.10 crowns	2,500 units in 1949
d. EY 3000	300.80 crowns	2,500 units in 1949

These tubes conformed to Philips products. The EL 150 was difficult to produce and was not perfect because it developed secondary emission of the grid. The AX 50, a mercury rectifier directly heated, was difficult to produce and was not perfect. The highest inversion voltage perscribed for this tube could not be achieved (I don't know why).

Miniatures

10. The 13Y31 was the first Czechoslovak miniature and has been produced in the Tesla Roznov plant since 1951 [redacted]. Since 1952 other types of miniatures have been produced but I do not know which types. The production of miniatures was at least as high if not higher than the production of all-glass tubes /see paragraph 5/. [redacted]

SECRET

SECRET

- 7 -

50X1

Electronic Receiver Tubes for Special Purposes

11. It is almost certain that the production of the RV 2.4 (?) P800, and RV 12 P3000 (perhaps 4000) tubes started in the Tesla Roznov plant in 1951. The preparations for this production were made in the Tesla Hloubetin II plant and were for from 50,000 to 100,000 units per year. [redacted] 50X1

Special Low-Power Electronic Tubes

12.	Type	Price	Remarks
a.	DCG 4/1000	373.00 crowns	A mercury rectifier for weak currents (about 1/2 ampere) of higher voltage (about 100,000 volts). About 3,000 units of this tube were produced in 1949.
b.	T367	unknown	About 3,000 units produced in 1949
c.	T1710	"	About 2,000 units produced in 1949
d.	T1738	"	About 1,000 units produced in 1949
e.	T1749	"	About 500 units produced in 1949

The last four tubes listed [b - e] were mercury rectifiers for strong current (from 10 to 100 a.) of low voltage (50-100 v.). All five tubes listed directly above were identical to Philips, Eindhoven, products. Even the designation was the same until 1948 when the letter "T" (Tesla) was added. These tubes were produced until 1950, in the special department of the Tesla Hloubetin II plant. Since 1950 these tubes have been produced in the Tesla Roznov plant. I believe that the quantities produced increased 50% to 100% during the years. [redacted] It is probable that some other types of electronic tubes of the same kind have been put into production in the Tesla Roznov plant.

Type	Remarks
f. T 329T	A short-wave broadcast type, which conformed to the RS 329, a Telefunken product. From 300 to 500 units were produced in 1949 by the Tesla Hloubetin II plant and most of them were exported to Yugoslavia. [redacted] after 1950 the production of this tube, [redacted] in the Tesla Roznov plant decreased.
g. LS 180	This tube conformed to a Telefunken product of the same designation. It was for military purposes. The Tesla Hloubetin II plant had tried since 1948 to produce this tube but had met with difficulties especially in the manufacture of the hard glass die casting, which to my knowledge were never overcome. By the end of 1949 only a few samples had been produced. [redacted] the quality of those samples but [redacted] it wasn't good. If the tube was put into production later on, it was at the Tesla Roznov plant.

13. A small transmitter tube [Encl. 17] for portable transmitters was developed in the Tesla Vrsovice plant in the second half of 1952 and turned over to the Tesla Roznov plant for mass production at the end of 1952. [redacted] This tube was developed

50X1

SECRET

SECRET
- 8 -

50X1

according to a US pattern which carried the figure "200" at the end of the designation. The tube was a short-wave (including ultra short waves) triode or tetrode, 200 watts anode dissipation, tungsten or tungsten-thorium cathode, spirally shaped and zircon coated, molybdenum grid, envelope was of hard glass and the bottom was a hard glass die casting.

50X1

14.

15. The special low-power electronic tubes listed below were produced in the Tesla Vrsovice plant. This factory, however, had tried since 1951 to transfer this production to the Tesla Roznov plant, where tubes in this category were being produced. By the however, the production had not been transferred.

50X1

50X1

Type	Price	Remarks
a. RD 200/3.5	3,000.00 crowns	<p>Directly-heated triode; heater voltage 10.5 v., heater current 4.25 a.; anode voltage 3,500 v.; anode dissipation 200 watts; cathode, tungsten thorium; grid, molybdenum; anode, molybdenum covered with molybdenum oxide; glass, molybdenum. This tube was similar to T-150-1, a Brown-Boveri, Switzerland, product. It was developed during 1949 and put into trial production in 1950 and into mass production in 1951. The planned output, which was, in general, actually achieved, was for 1951, 1,800 units; for 1952, 3,000 units. The planned output for 1953 was 13,416 units. I believe that this figure was too high and that the factory could produce only about 6,000 units in 1953.</p> <p>During 1951 and 1952, about 90% of the tubes produced were sent to the Chirana National Enterprise in Sezemice <u>N 50-04, E 15-517</u> to be used in apparatus for short-wave diathermy. (This apparatus was marked "Endotherm" and was for both domestic and Satellite, probably including China, consumption. However, the tube was not perfect for the reasons given below, and the Chirana plant used to import a similar type of tube from Hungary to cover about 30% of its total need. About 10% of these tubes produced in 1951 and</p>

SECRET

TypePrice**SECRET**

- 9 -

Remarks

50X1

50X1

1952 were used as modulators in transmitters in Czechoslovakia (about 50 units per year were used for the Prestige N 49-34, E 13-19 transmitter) and for transmitters probably intended for jamming, which were in production in the Tesla Hloubetin II plant. 50X1

50X1

and the remainder for the new jamming transmitters. The three main defects of these tubes were:

- (1) The tungsten thorium cathodes produced in Czechoslovakia were not perfect. These cathodes had an unsteady emission (the emission decreased with use).
- (2) When in operation in apparatus for short-wave diathermy, the envelope was often punctured, primarily because the getter coating on the inside of the glass envelope developed excessive heat of the glass where it was exposed to high frequency. This condition was somewhat improved in the 50X1 tube was equipped with tube getter.
- (3) Circuits between the cathode and the grid were caused by the insufficiently flexible spiral which, in turn, could be attributed to the poor quality of the material (molybdenum or tungsten) and improper production technique. This was improved in the second half of 1952 by changing the design of the spiral.

No guarantee was given for this tube. The actual life was about 500 hours in 1951 and only about 400 hours. The average number of rejects in production was about 40%. 50X1

D. CU 6

400 crowns

Directly heated rectifier, diode, heater 10 v.; anode voltage 1,000 v.; anode dissipation 40 w.; anode, nickel, oval shaped; cathode, nickel oxide. Lead glass. The planned output which was, in general, actually achieved, was 250 units for 1951, 300 units for 1952. The planned output for

50X1

SECRET

SECRET
- 10 -

Type	Price	Remarks
		The average rate of factory re-jects was 15%. The guarantee was 600 hours; actual life was about 900 hours in 1948 and 600 hours
c. DET 5	538.00 crowns	Directly heated triode; anode dissipation, 25 watts; anode voltage, 600 volts; heater voltage, 2.5 volts; anode, nickel, oval-shaped; cathode, nickel oxide; grid, supporting wires copper wound with molybdenum wire. The planned production which was, in general, actually achieved, was 1,130 units for 1951, 1,340 units for 1952. The planned production was 5,173 units; this figure was too high and only about 2,600 units could be produced. The average rate of factory rejects was about 25%. The guarantee was 600 hours; actual life was about 900 hours in 1948 and 600 hours
CU 6 and DET 5 tubes were used, in 1951 and 1952, both for transmitters in operation in Czechoslovakia and for new transmitters under construction in the Tesla Hloubetin plant as mentioned above. The increased output was destined for these new transmitters.		

Type	Price	Remarks
d. DET 11	1,900.00 crowns	Special short-wave triode, (lowest limit 10 meters); anode dissipation, 40 watts; anode voltage, 2,000 volts; heater voltage, 10 volts; cathode, directly heated, nickel oxide; anode, nickel oval-shaped covered with carbon; grid, supporting wires copper wound with molybdenum wire; lead glass. The planned production which was, in general, actually achieved, was 350 units for 1951, 330 units for 1952. The planned production for 1953 was 716 units
The guarantee was 600 hours; actual life was about 900 hours in 1948 and 600 hours		
The average rate of factory re-jects was about 22%. This tube was used for an older type of diathermy apparatus, and for transmitters in operation, as well as for new radio transmitters which were under construction.		
this tube was used for new jamming transmitters because the planned production for did not show sudden increase		

SECRET

SECRET

- 11 -

Type	Price	Remarks
		50X1
		(Eng. KLIKA, Chief Designer for Transmitter Production with the Tesla Maubetin plant, said [redacted] 50X1
	50X1	[redacted] that the DET 11 was an outmoded type of tube but that it had to be used because a newer type was not available.
e. PT 6B	3,300.00 crowns	Pentode, anode dissipation, 60 watts; anode voltage, 1,500 volts; heater voltage, 10 volts; 2nd grid voltage, 600 to 800 volts; anode, nickel covered with carbon; cathode, directly heated, nickel oxide; first grid, supporting wires copper wound with molybdenum wire; second and third grid, supporting wires nickel wound with molybdenum wire. (This tube was similar to the GL-828, a General Electric product.) The planned production which was, in general, achieved, was 320 units [redacted] 50X1
	50X1	[redacted] could be reached. The guarantee was 600 hours; actual life was about 800 hours in 1948 and 400 hours [redacted] The average rate of factory rejects was about 50%. This tube was used for amplifiers and transmitters. Some of the total production of this tube was sent to the Regional Administration of Communications (Krajska sprava spoju) in Satellite near Prague, for some communications equipment.
f. RHT 1 (Later marked RHT 2)		Diode, heater voltage 1.9 v.; anode voltage, 200 v.; anode current, 20ma; anode, nickel; short tubing; cathode, directly heated, tungsten thorium. The planned production, which was, in general, achieved, was 1,400 units in 1951. This tube was not [redacted] 50X1
	50X1	[redacted] The average rate of factory rejects was about 15%. No guarantee was stipulated; I think that the actual life was about 500 hours. This tube had the defect of being too sensitive to shocks. It was used as regulator in transmitters.

SECRET

SECRET
- 12 -

50X1

Production of Sun Lamp Burners

16. The special department of Tesla Hloubetin II plant had been repairing sun lamps since 1948. From about 1949, the plant also produced burners for sun lamps. These sun lamp burners were destined for Chirana National Corporation, at Prague, Stepanska Street, which assembled the sun lamps. The sun lamps were sold both in Czechoslovakia and the Satellites. The sun lamp burners conformed to the "Original Hanau" products. Dr. POHLE, a German, who returned to Vienna in 1949, was in charge of this development.
17. The Tesla Hloubetin II plant repaired high-pressure burners, mercury filled, and repaired and produced low-pressure burners with argon filling with a mercury drop. The low-pressure burners were of two types /Encl. 27:
- a. S 200, a 200 watt burner
 - b. S 300, a 300 watt burner

50X1

The tubing was of silicon oxide glass (quartz glass). This glass was not produced in Czechoslovakia. About 400 units of the S 200 type and about 200 units of the S 300 type were produced in 1949. From 1950 these were produced in the Tesla Roznov plant

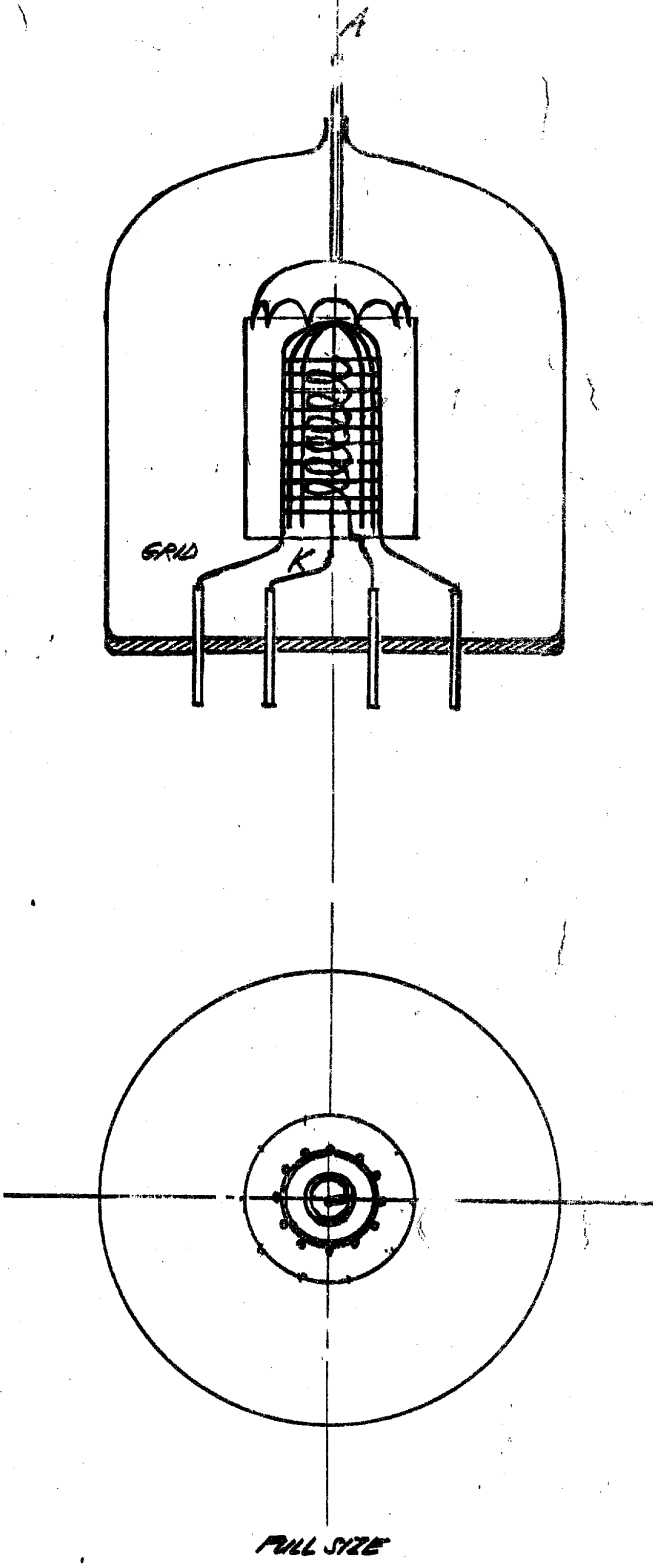
50X1

Enclosures:

- 1. Small Transmitter Tube
- 2. Sun Lamp Burners

SECRET

Enclosure 1: Small Transmitter Tube



- 200

FULL SIZE

ENCLOSURE 1.

SECRET

SECRET
- 14 -

S 200
IN FULL SIZE

50X1

ENCLOSURE 2. Sun Lamp Burners

